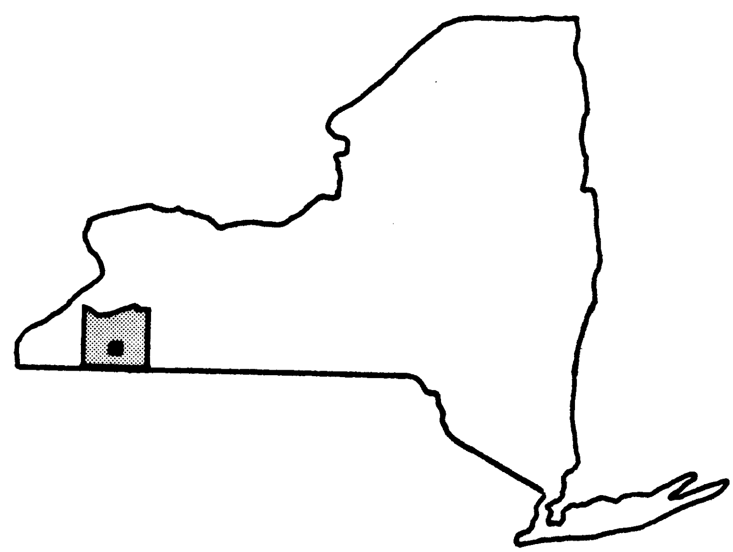
FLOOD INSURANCE STUDY

TOWN OF SALAMANCA, NEW YORK
CATTARAUGUS COUNTY



MAY 1979

U.S. DEPARTMENT of HOUSING & URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

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FLOOD INSURANCE STUDY
TOWN OF SALAMANCA, NEW YORK

1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the Town of Salamanca, Cattaraugus County, New York, and to aid in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert the Town of Salamanca to the regular program of flood insurance by the Federal Insurance Administration (FIA). Further use of this information will be made by local and regional planners in their efforts to promote sound land use and flood plain development.

1.2 Coordination

At a meeting on May 26, 1975, with representatives of the Town of Salamanca, the U. S. Army Corps of Engineers (COE), the FIA, the Southern Tier West Regional Planning Board, the Soil Conservation Service (SCS), the Cattaraugus Planning Board, and the New York State Department of Environmental Conservation (DEC) the purpose of the Flood Insurance Study was explained.

A search for basic data was made at all levels of government. The SCS provided photomosaic contour maps at a five-foot contour interval, which served as part of the input for the location of flood boundary lines. Both the SCS and the COE provided copies of previously surveyed cross sections of Little Valley Creek and the Allegheny River which served as part of the input for the hydraulic analysis. The U. S. Geological Survey (USGS), was contacted in order to obtain contour maps showing drainage boundaries and records of flow data.

On July 13, 1976, a meeting was held with officials of the town to obtain additional local input. The final Consultation and Coordination meeting was held on February 24, 1977, where the final draft of the Flood Insurance Study was presented for further local comment. The final meeting was attended by the Town Supervisor, Town Clerk, a Trustee of the town, and a number of local residents. At this meeting, comments were received with respect to the locations of the inundation limits, especially those done by the approximate methods. As a result of this local input, the inundation limits have been adjusted to more closely coincide with field observations.

1.3 Authority and Acknowledgements

The source of authority for the Flood Insurance Study is the National Flood Insurance Act of 1968, as amended.

The hydrologic and hydraulic analyses for this study were done by the New York State Department of Environmental Conservation for the Federal Insurance Administration, under Contract No. H-3856. This study, which was completed in March 1977, covered all significant flooding sources in the Town of Salamanca.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Town of Salamanca, New York. Not included are the Allegany Indian Reservation lands which separate the two portions of the Town of Salamanca nor the state forest lands within the town limits. The City of Salamanca, which is also within the Indian reservation, is being studied separately.

The area of study is shown on the Vicinity Map (Figure 1).

The principal stream within the town is Little Valley Creek which flows south-southeast through the town for a distance of 1.91 miles where it passes into the City of Salamanca. It was agreed between the FIA and officials of the town that Little Valley Creek was to be studied in detail because of the scattered development within the flood plain, and the expectation of continued development due to its close proximity to the City of Salamanca. The area studied in detail was chosen with consideration given to all forecasted development and proposed construction for the next five years (through March 1982).

Two other significant streams within the town, Bucktooth Run and Sawmill Run, are both tributaries of the Allegheny River. It was agreed to study these two watercourses as well as two tributaries to Bucktooth Run, East Branch and West Branch, with a total length of 5.50 miles, by approximate methods due to the general lack of development.

There are several other small streams within the town, including Newton Run, Drake Run, Breeds Run, and Titus Run, as well as several unnamed streams. None of these were studied, however, due to their small size and the absence of adjacent development.

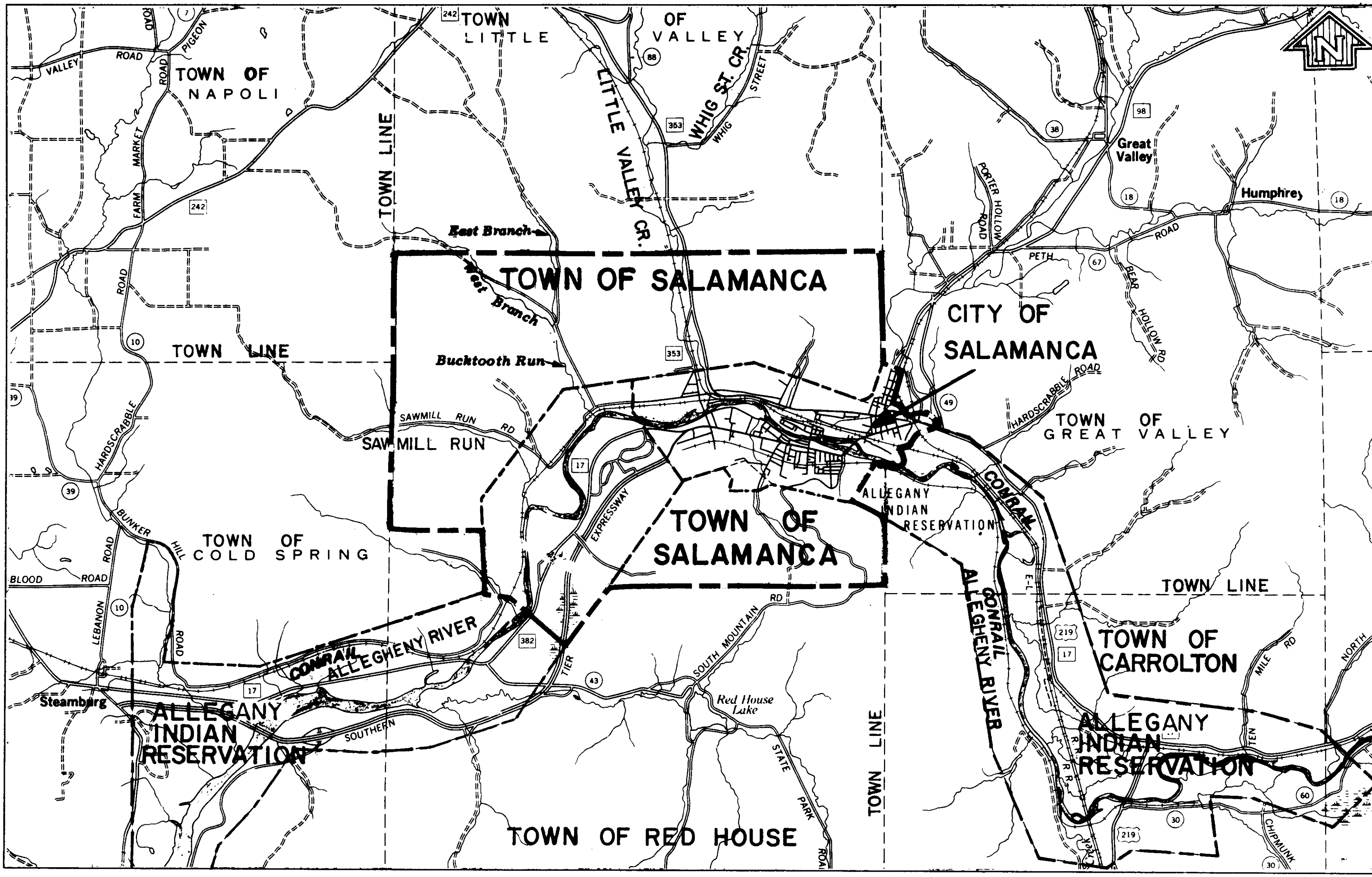

FIGURE 1

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWN OF SALAMANCA, NY
(CATTARAUGUS CO.)

APPROXIMATE SCALE

2 0 2 4 6 miles

VICINITY MAP

2.2 Community Description

The Town of Salamanca lies within the Allegheny Plateau, an area of rolling uplands cut by numerous steep walled valleys. Approximately three quarters of the town lies north of the Allegheny River. The remaining quarter lies south of the river and forms part of the Allegheny State Park. Separating these two portions is the Allegany Indian Reservation which includes the Allegheny River and its flood plain on both sides.

Little Valley Creek flows south through the town until it joins the Allegheny River in the City of Salamanca. The Allegheny River, which rises in Pennsylvania, flows in a wide loop through a portion of New York State, before merging with the Monongahela River at Pittsburgh to form the Ohio River.

Land surface elevations within the town vary greatly. The highest elevations are found in the western portion of the town with several places above 2,300 feet. The lower elevations are along the stream beds, most notably Little Valley Creek which has an approximate elevation of 1,400 feet at the point where the creek crosses into the City of Salamanca (Reference 1). All elevations used in this report are referenced in feet to the National Geodetic Vertical Datum of 1929 (NGVD), formerly referred to as Sea Level Datum of 1929.

Cattaraugus County is characterized by two distinct physiographic regions: the Northwestern Appalachian Plateau Border and the Allegheny Plateau (Reference 2). The Town of Salamanca is located on the Allegheny Plateau which is set off because of the more rugged topography and considerably higher elevation. The northern boundary of this plateau follows the trend of the Allegheny River but is 4 to 6 miles north of the river. The plateau is unique in that it represents the only portion of New York State which was not covered with ice during the last glacial period. Because of this lack of glacial action the area retains its rugged topography with longer and steeper slopes and lacks the irregular hilly character of the glaciated areas to the north.

The soils within the town, being unaffected by glaciation, have been developed in place through soil forming processes acting directly on the underlying rocks, which include shales, sandstones, and quartz conglomerates. The resulting soils are generally low in fertility, strongly acid, and well-drained.

Woodland and agriculture account for nearly all the private land use within the town. Creek valleys and the flood plain provide important north-south transportation corridors. State Highway 353 and Conrail both follow Little Valley Creek. Some residential development has also occurred along the valley bottoms. Residential development may be expected to continue as people move into the valleys from the City of Salamanca which partially bisects the town, and the nearby Village of Little Valley, which forms the northern border.

The Town of Salamanca is bounded on the west by the Towns of Napoli and Cold Spring, on the south by the Town of Red House, and on the east by the Town of Great Valley.

The population level of the Town of Salamanca remained basically constant for the first half of this century. Since then, however, the town has shown a rapid growth rate of 60 percent between the 1950 population level of 355 persons, and the 1970 level of 571 persons (Reference 3).

The climate is typical of the temperate continental with some local variations due to elevation differences. Average January and July temperatures are 23° F and 70° F, respectively. Total annual precipitation is about 40 inches, of which approximately 23 inches becomes runoff (Reference 4).

Portions of the flood plain along Little Valley Creek are illustrated by Figures 2 and 3.

2.3 Principal Flood Problems

Little Valley Creek rises in the hills several miles northwest of the Village of Little Valley. The creek, which flows south-southeast, joins with Dublin Creek and Whig Street Creek and has a total drainage area of slightly over 45 square miles when it crosses the northern corporate limit into the Town of Salamanca. Because of the steep topography within the basin, it is subject to flash flooding from cyclonic disturbances of high intensity, even when such storms are of short duration. Flooding of this type is most prone to occur between January and April when surface runoff is augmented by snowmelt. Flooding due to back-water effects of ice jams is not considered to be a major problem within the study area.

Some flooding problems also result from backwater conditions on the Allegheny River, which can occur independently of flooding on Little Valley Creek. The river flows entirely through the lands of the Allegany Indian Reservation, however, and therefore is not included as a part of this study.

Figure 2 - Little Valley Creek in the Town of Salamanca.
Looking south near the boundary with the Town of Little Valley.

Figure 3 - Little Valley Creek in the Town of Salamanca
near crossing of Route No. 353.

The USGS has no streamflow records on Little Valley Creek. Residents along the stream have been interviewed and newspaper files and previous flood information reports of the area searched for information concerning past floods. From these investigations, it is known that large magnitude floods have occurred numerous times during the past 60 years causing serious flooding problems. Recent occurrences of major flooding have occurred in March 1956, September 1967, and June 1972. There is insufficient information on these events to allow an estimate of the recurrence intervals.

2.4 Flood Protection Measures

There are no flood control projects presently existing within the study area. The City of Salamanca has an extensive system of floodwalls and levees to protect the city from Allegheny River flooding. This system continues for a short duration up Little Valley Creek to contain floodwater back-up from the Allegheny River.

3.0 ENGINEERING METHODS

For the flooding source studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Floods having recurrence intervals of 10, 50, 100, and 500 years have been selected as having special significance for flood plain management and for flood insurance premium rates. The analyses reported here are based on current conditions in the watershed of the stream.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for the stream studied in detail in the community.

Several methods of analysis were used to provide hydrologic input for the Flood Insurance Study. To provide the hydrology for uncontrolled drainage areas larger than five square miles, use was made of a regional analysis which was prepared by the DEC (Reference 5). This regional analysis used USGS stream gaging records (Reference 6) for maximum peak flow to establish frequency-discharge, drainage area curves at selected points along the waterways of the Allegheny River Basin.

The statistical procedures used in the regional analysis are those proposed by Leo R. Beard (Reference 7), which is the use of a log-Pearson Type III distribution as a base method for flood flow frequency studies. This methodology conforms with the uniform technique for determining flood flow frequencies as set forth by the Hydrology Committee of the United States Water Resources Council (Reference 8).

For uncontrolled drainage areas smaller than five square miles, the hydrology was established through the use of a Bureau of Public Roads technique (Reference 9). This technique utilizes a correlation between discharge and major basin characteristics such as drainage area, topography, and precipitation.

Information derived from the use of these techniques, as it was applied for use in the detailed analyses, is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
LITTLE VALLEY CREEK					
At downstream corporate limit	46.4	4,066	6,081	9,024	9,375
Above mouth of Whig Street Creek	33.7	3,115	4,634	5,342	7,101

For streams studied by the approximate method, use was made of the Flood Height-Drainage Area Relation for the 100-year flood which was developed by the Water Resources Division of the USGS (unpublished Staff Document, Albany, New York, 1973). This method yields an approximate 100-year flood height as a depth of water above a contour crossing, or normal water-surface. The relationship used was developed for the Upper Genesee River Basin because no relationship has been developed for the Upper Allegheny Basin in New York State. The Upper Allegheny and Upper Genesee Basins are contiguous and are similar geographically, geologically, and in land use and cover.

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the stream studied in detail in the community were carried out to provide estimates of the elevation of floods of the selected recurrence intervals along this stream.

For the stream studied in detail, flood profiles were calculated using the COE HEC-2 water-surface profiles computer program (Reference 10) which is in general use for unobstructed flow conditions.

The program applies theorems for total energy and friction loss to calculate the water-surface profile for any cross section of a river channel. The water-surface elevation at the beginning cross section can be specified or can be calculated using a slope area method which uses the slope of the energy grade line and the discharge to determine starting water-surface elevations. The slope area method was the technique used to determine starting elevations for Little Valley Creek.

Cross sections were located at close intervals above and below bridges, at control sections along the stream length, and at significant changes in ground relief and land use or land cover. The cross section geometry was determined by field survey, as was the base line which was used for horizontal control along the stream channel.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). In stream segments for which a floodway is computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 3).

Reach lengths for the channel were measured along the centerline of channel between sections and overbank reach lengths were measured along the approximate centerline of the effective out-of-channel flow area.

Roughness coefficients (Manning's "n") were assigned on the basis of on-site field inspections and ground level photos. These photos were compared with USGS calibrated photographs (Reference 11) taking into consideration channel conditions, overbank vegetation and land use. The values of the roughness coefficients vary from 0.045 to 0.048 for the main channel, and 0.035 to 0.048 for the overbank areas.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals. All elevations are referenced to NGVD; elevation reference marks used in the study are shown on the maps.

Flood elevations higher than those computed through use of the HEC-2 step-backwater program can occur as a result of the effect of ice jams during spring thaws. However, adequate data are not available to establish stage/frequency relationships for this condition. The flood elevations as shown on the profiles are thus considered valid only if hydraulic structures in general remain unobstructed.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

A prime purpose of the National Flood Insurance Program is to encourage state and local governments to adopt sound flood plain management programs. This Flood Insurance Study, therefore, includes a flood boundary map designed to assist the town in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FIA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For the stream studied in detail, the boundaries of the 100- and the 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps, developed for this study from aerial photographs (Reference 12) at a scale of 1" = 400' with a contour interval of 5 feet. In cases where the 100- and 500-year flood boundaries are close together, only the 100-year boundary has been shown.

For streams studied by approximate methods the boundary of the 100-year flood has been delineated using the flood elevations determined at cross sections, and interpolated between cross sections using the topographic maps referenced above. In the case of Bucktooth Run and its tributaries East Branch and West Branch, the 100-year flooding was determined to be moderate. The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 3).

Small areas within the flood boundaries may lie above the flood elevations and, therefore, may not be subject to flooding; owing to limitations of the map scale, or lack of detailed topographic data, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the Flood Insurance Program, the concepth of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe.

The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood be carried without substantial increases in flood heights. Minimum standards of the FIA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodway in this report is presented to local agencies as a minimum standard that can be adopted or that can be used as a basis for additional studies.

The floodway presented in this study was computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations are tabulated at selected cross sections of the stream segment for which a floodway is computed (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 3), the floodway widths were determined at cross sections; between cross sections the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood boundaries were either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses that portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 4.

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for each flooding source affecting the Town of Salamanca.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Little Valley Creek							
A	5,140	195	824	8.53	1384.99	1384.15	0.84
B	5,330	200	1,106	6.35	1387.94	1387.94	0.00
C	5,585	457	2,405	2.92	1390.95	1390.95	0.00
D	5,735	441	2,168	3.24	1390.95	1390.95	0.00
E	7,285	139	550	12.77	1395.95	1395.95	0.00
F	9,545	340	1,220	5.76	1406.67	1405.85	0.82
G	10,443	600	1,957	3.59	1408.74	1408.56	0.18
H	10,625	135	738	9.52	1410.38	1410.38	0.00
I	10,725	251	1,697	4.14	1411.89	1411.89	0.00
J	12,230	175	653	10.76	1415.53	1415.53	0.00

[1]FEET ABOVE CONFLUENCE WITH ALLEGHENY RIVER

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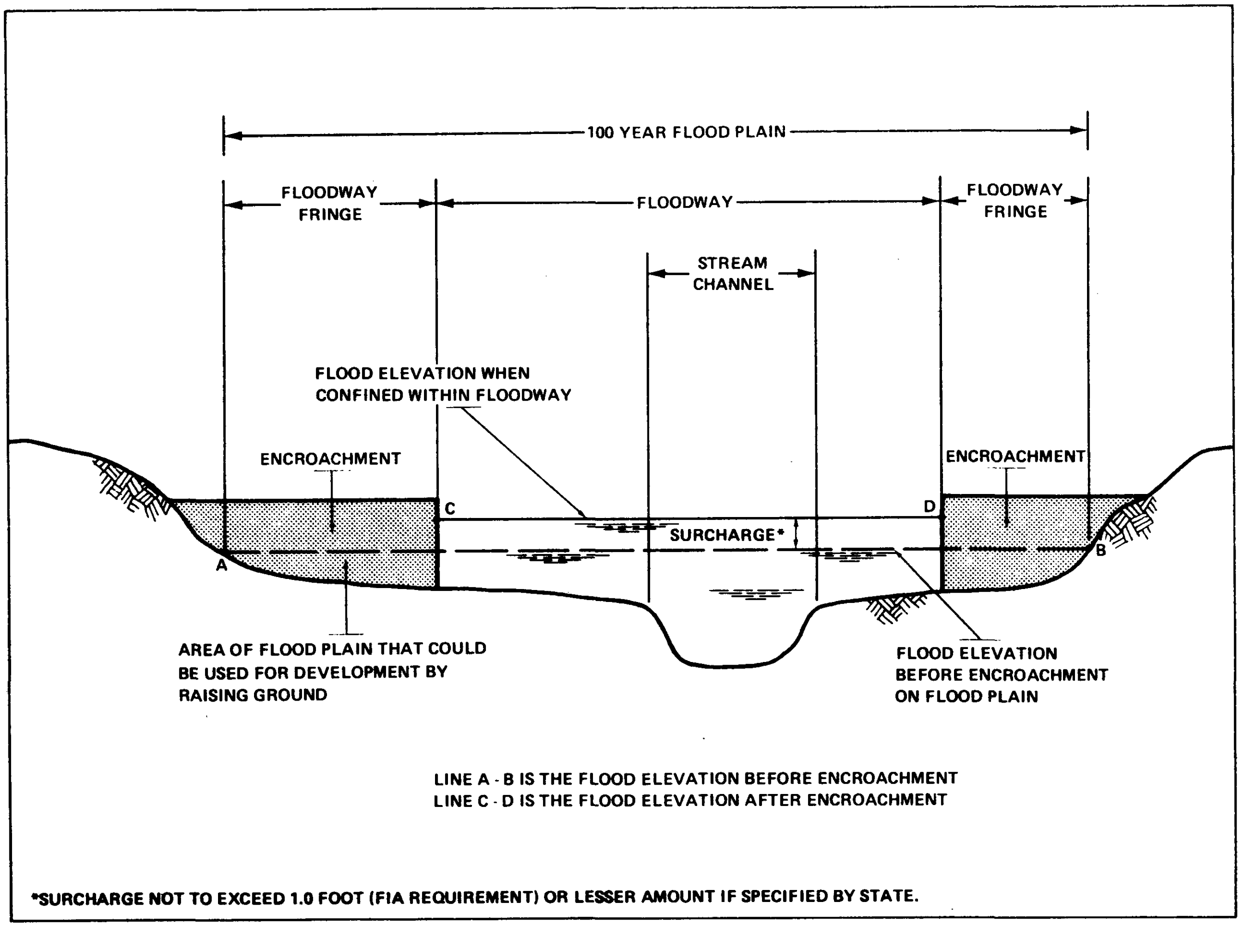
FLOODWAY DATA

LITTLE VALLEY CREEK

TABLE 2



FLOODWAY SCHEMATIC Figure 4

This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-year Floods	Variation
Less than 2 feet	0.5 foot
2 feet to 7 feet	1.0 foot

Four reaches meeting the above criteria were used to establish flood insurance zones for the flooding source studied in detail in the Town of Salamanca. The locations of the reaches are shown on the Flood Profiles (Exhibit 1).

5.2 Flood Hazard Factors

The FHF is the FIA device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference of water-surface elevations between the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire area of study was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following Flood Insurance Zone Designations:

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.
Zone A2, A3, A4, A6:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevation shown, and zones assigned according to FHFs.
Zone B:	Areas between the Special Flood Hazard Areas and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; or, areas subject to certain types of 100-year shallow flooding, where depths are less than 1.0 feet. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for the flooding source studied in detail in the Town of Salamanca.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10-YR.)	2% (50-YR.)	0.2% (500-YR.)			
Little Valley Creek							
Reach 1	05	-1.4	-0.45	+0.88	015	A3	Varies
Reach 2	05	-2.8	-0.58	+1.04	030	A6	Varies
Reach 3	05	-1.1	-0.43	+0.72	010	A2	Varies
Reach 4	05	-2.2	-0.44	+1.00	020	A4	Varies

[1] FLOOD INSURANCE RATE MAP PANEL
[2] WEIGHTED AVERAGE
[3] ROUNDED TO NEAREST FOOT – SEE MAP

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Federal Insurance Administration

TOWN OF SALAMANCA, NY
(CATTARAUGUS CO.)

FLOOD INSURANCE ZONE DATA

LITTLE VALLEY CREEK

TABLE 3

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Town of Salamanca is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevation of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

6.0 OTHER STUDIES

No other studies of flooding have been performed for the Town of Salamanca. Flood Insurance Studies are currently underway by the New York State Department of Environmental Conservation for other communities within the Allegheny Basin. Communities included in these studies are the Town and Village of Little Valley, Town of Great Valley, Town of Napoli, Town of Cold Spring, and City of Salamanca, all of which are contiguous to the Town of Salamanca. The data for contiguous communities is compatible to assure agreement of results across municipal boundaries.

This study is authoritative for purposes of the Flood Insurance Program, and the data presented here either supersede or are compatible with previous determinations.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study can be obtained by contacting the office of the Federal Insurance Administration, Regional Director, 90 Church Street, Room 801, New York, New York 10007.

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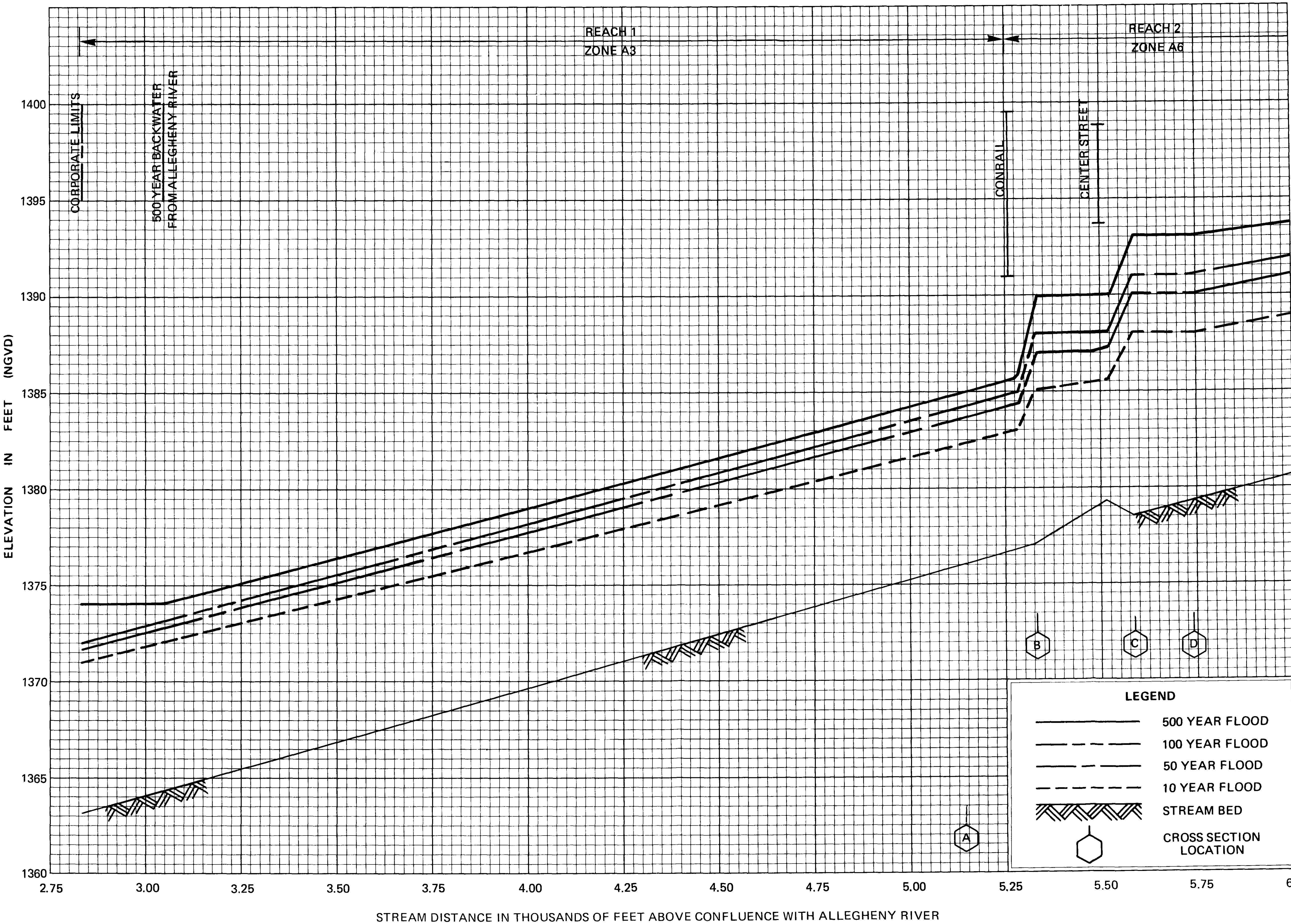

FLOOD PROFILES

LITTLE VALLEY CREEK

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Federal Insurance Administration

TOWN OF SALAMANCA, NY
(CATTARAUGUS CO.)

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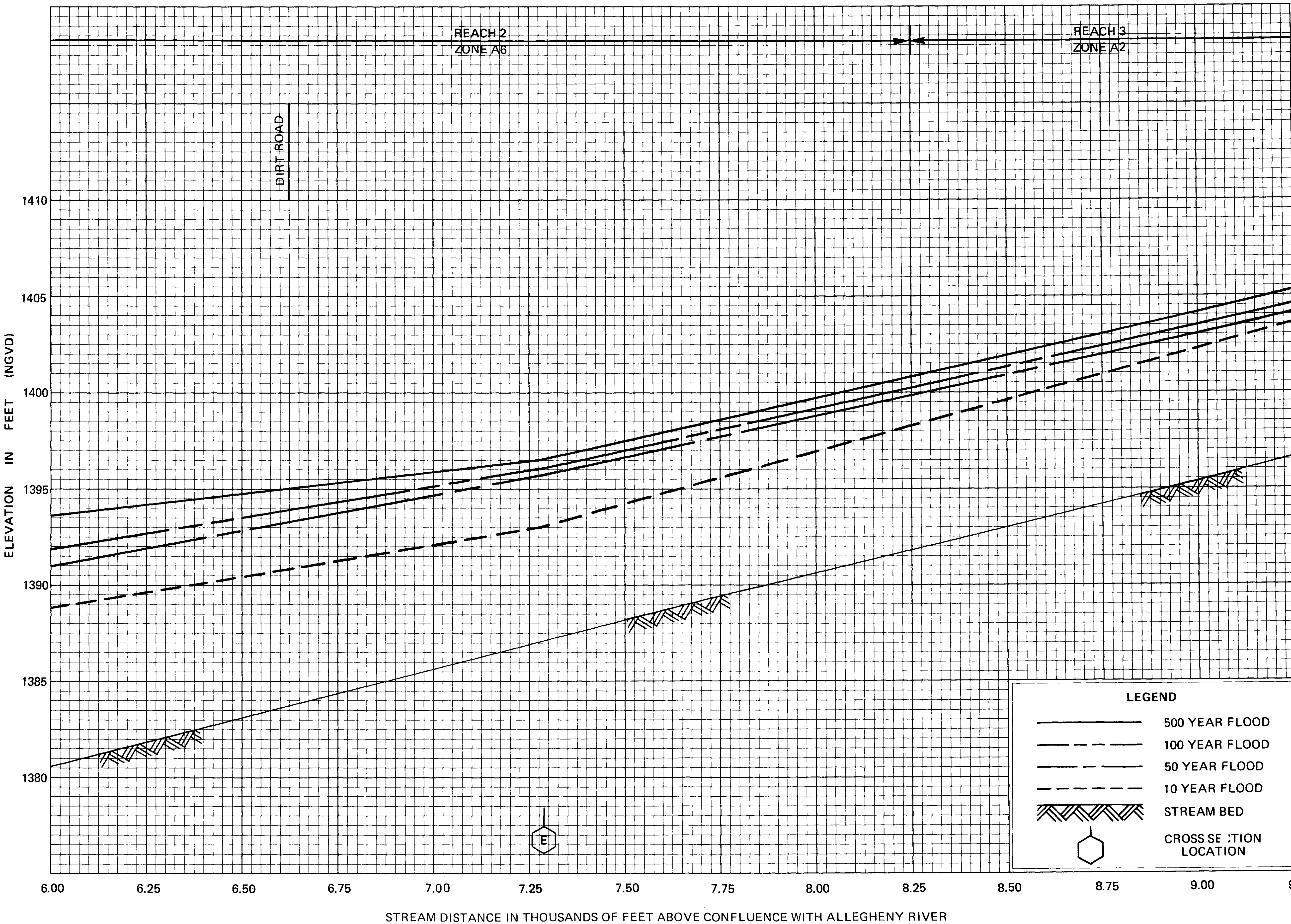

FLOOD PROFILES

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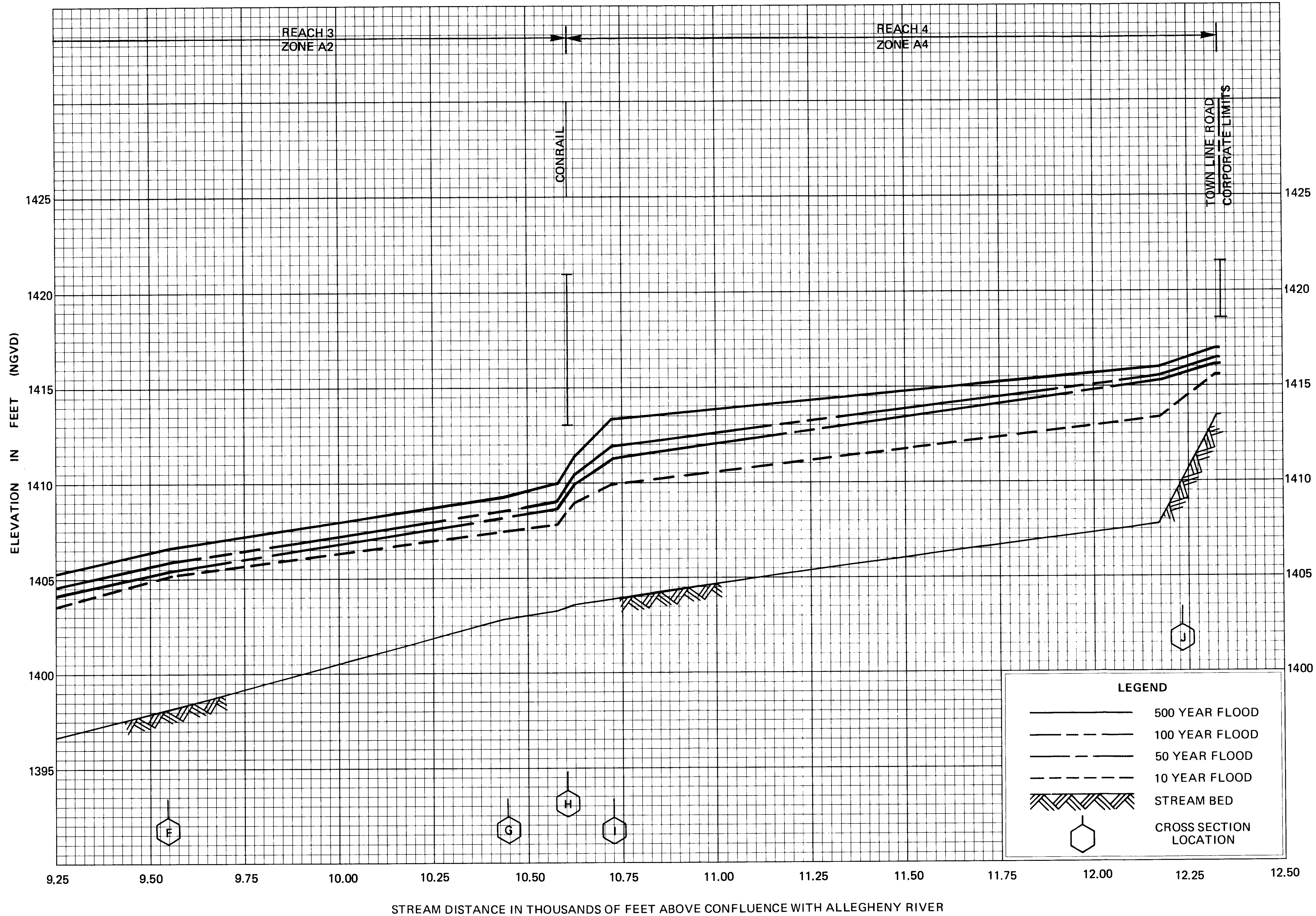

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